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LABORATORY ANALYSIS OF "PITCH CANKER"[1/] SAMPLES FROM FLORIDA SLASH PINE PLANTATIONS AND SEED ORCHARDS 1976

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ABSTRACT

Damage samples with "pitch canker" symptoms were collected from 41 counties in Florida and submitted for laboratory analysis. These samples were randomly collected from both slash pine plantations and seed orchards. The organism most frequently isolated was Fusarium moniliforme. *Other organisms isolated less frequently were:* F. solani, F. oxysporum, *and* Pestalotia sp.

INTRODUCTION

Pitch canker of pine has been cited as being caused by *Fusarium lateritium f. pini* (Nees.) Hepting since 1944. The disease was first observed and described by Hepting on Virginia pine (*Pinus virginiana* Mill.) near Asheville, N.C. (1). Since that time it has been reported to attack several species of pine. Slash pine (*P. elliottii* Engelm.), which is a major resource of Florida's forestry industry and a major host of this disease, has been attacked by this disease in Florida slash pine plantations since 1969 (3). The severity of attack has been sporadic and in the past few years its incidence has been increasing. The disease has been found in all 67 Florida counties in seed orchards, plantations, and natural stands (2). It was our objective to determine which organisms were associated with the "pitch canker" disease in Florida.

1/ The samples submitted for analysis all exhibited symptoms similar to those of "pitch canker" caused by *Fusarium lateritium f. pini.*

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4/ Entomologist, Florida Division of Forestry. Acknowledgement is made for the field assistance furnished by personnel of the Florida Division of Forestry; L. Barber and R. D. Wolfe, entomologist and pathologist, Asheville Field Office, S&PF; N. A. Overgaard and H. N. Wallace, entomologist and biological technician, Alexandria Field Office, S&PF, without whose assistance this project could not have been completed.

MATERIALS AND METHODS

During late March, April, and May, trees with typical symptoms of "pitch canker" were sampled. This sampling was part of an evaluation made throughout all Florida counties in slash pine seed orchards and plantations (2). Sample trees were randomly selected. Samples included terminal and lateral branch specimens. Age classes of 3-29 years were included in this sampling scheme. Samples were labeled according to county, species, age class, type specimen (terminal or branch), and in seed orchards, clone identification. A portion of the plantation samples was sent to the Alexandria Field Office by mail, and others were picked up by car in Florida and cooled in ice chests. All seed orchard samples were shipped by air freight in ice chests. Upon receipt, all samples were refrigerated until cultured.

Samples were processed according to the methods outlined by Toussoun and Nelson (5). Bark was stripped from damage samples and the advancing zone of infection was located. Small chips of sapwood were removed from this area and plated on potato-dextrose-agar (PDA) plates and on Nash's Medium. After it was determined that both media yielded *Fusarium* spp. exclusively, PDA use was discontinued. The plates were incubated at room temperature (30° C.) until the fungi had grown completely around the chip. These colonies were then singled-spored. Single spores of *Fusarium* sp. were placed in fresh PDA tubes. They were placed in an inclined position under fluorescent lights. These tubes were kept in this position and under light for at least 30 days (Fig. 1). At the end of this time, identification of the Fusaria was made.

RESULTS

Plantations:

Plantations from within 38 counties in Florida were sampled (Table 1). A total of 170 samples were received and cultured. Culture analysis has yielded 164 isolates of *Fusarium moniliforme* (Fig. 2), two isolates of *F. oxysporum*, one isolate of *F. solani*, and three isolates of *Pestalotia* sp.

Seed Orchards:

Samples from 31 clones were collected from eight seed orchards in nine counties in Florida (Table 2). A total of 97 individual samples were received. Culture analysis yielded 100 percent *Fusarium moniliforme*.

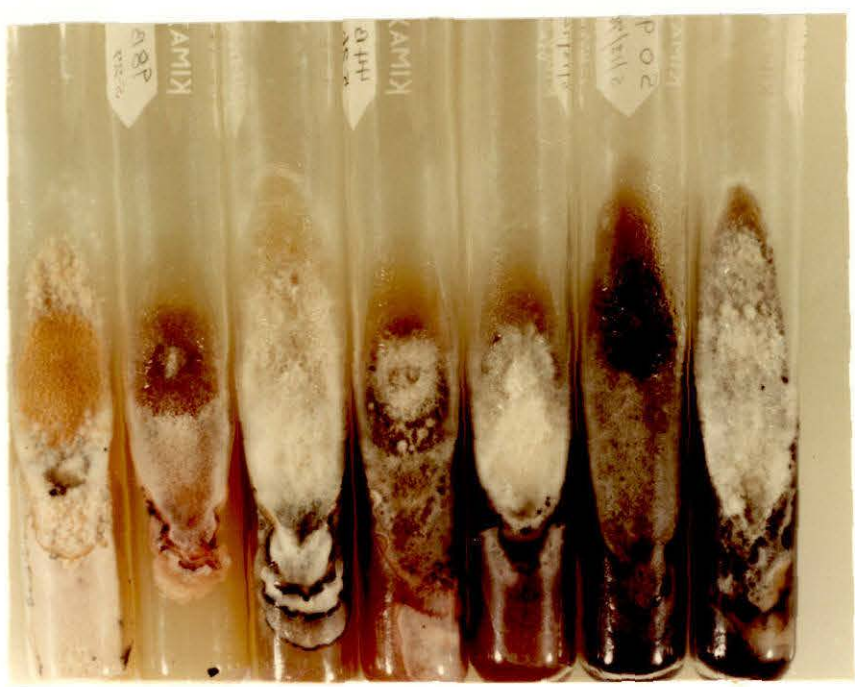

Fig. 1. *F. moniliforme* grown under fluorescent lights. Tubes are 30 days old.

Table 1. Summary of sample information from 38 plantations in Florida

County	No. Samples Received	No. and Type Organisms Isolated from Pitch Canker Samples[a/]			
		Pestalotia sp.	*Fusarium moniliforme*	*F. solani*	*F. oxysporum*
Bay	3	--	3	--	--
Calhoun	4	--	4	--	--
Walton	2	--	2	--	--
Okaloosa	1	--	1	--	--
Santa Rosa	1	--	1	--	--
Holmes	2	--	2	--	--
Franklin	2	--	2	--	--
St. Lucie	2	--	2	--	--
Glades	5	--	5	--	--
Highlands	3	1	2	--	--
Lee	10	--	10	--	--
Citrus	2	--	2	--	--
Gilchrist	5	--	5	--	--
Levy	6	--	4	--	2
Marion	4	--	4	--	--
Suwannee	2	--	2	--	--
Alachua	2	--	2	--	--
Sumter	1	--	1	--	--
DeSoto	7	1	6	--	--
Hernando	5	--	5	--	--
Lee	3	--	3	--	--
Madison	5	--	5	--	--
Pasco	5	--	5	--	--
Orange	6	--	6	--	--
Taylor	2	--	2	--	--
Lafayette	3	1	2	--	--
Dixie	5	--	5	--	--

[a/] Organism identification was confirmed by Drs. P.E. Nelson and T. A. Tousson, The Pennsylvania State University, University Park, PA.

Table 1. (Continued) -

County		No. Samples Received	No. and Type Organisms Isolated from Pitch Canker Samples[a/]			
			Pestalotia	*Fusarium moniliforme*	*F. solani*	*F. oxysporum*
Volusia		8	--	8	--	--
Seminole		4	--	4	--	--
Flagler		18	--	18	--	--
Polk		4	--	4	--	--
Columbia		2	--	1	1	--
Hillsborough		7	--	7	--	--
Hamilton		7	--	7	--	--
St. John		9	--	9	--	--
Clay		7	--	7	--	--
Baker		6	--	6	--	--
Total	38	170	3	164	1	2

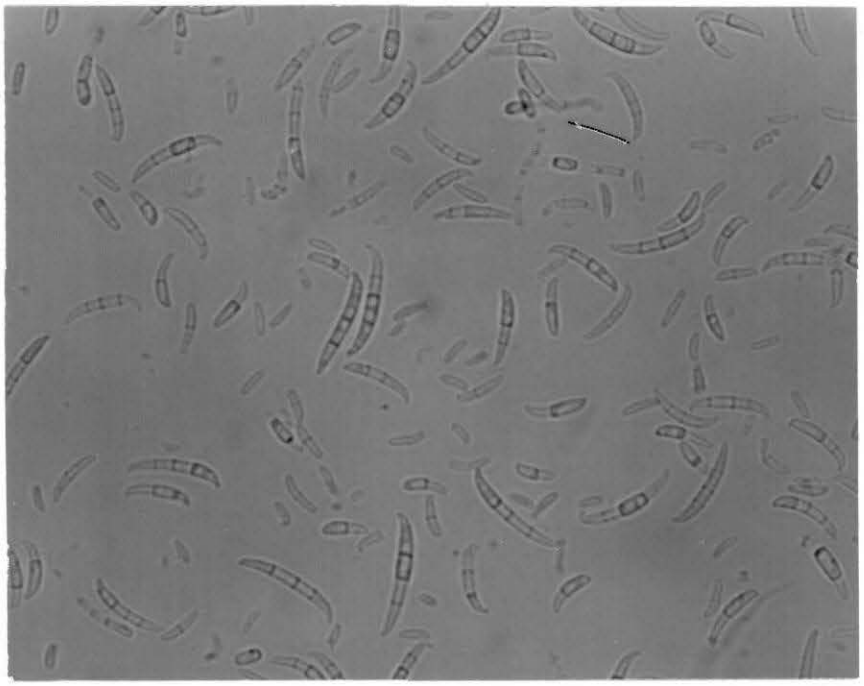

Fig. 2 Micro- and macroconidia of *Fusarium moniliforme*.

Table 2. Summary of sample information from 8 seed orchards in Florida.

Seed Orchard	County	Clone	No. Samples Received	Organism Identification
International Paper Co.	Jackson	FA-2	8	*Fusarium moniliforme*
International Paper Co.	Jackson	OK-8	15	"
International Paper Co.	Jackson	STA-19	4	"
Florida Div. of Forestry (Munson)	Santa Rosa	203	1	"
Florida Div. of Forestry (Munson)	Santa Rosa	B-702	3	"
Florida Div. of Forestry (Munson)	Santa Rosa	1008	7	"
Florida Div. of Forestry (Munson)	Santa Rosa	1002	1	"
Florida Div. of Forestry (Munson)	Santa Rosa	310	5	"
Florida Div. of Forestry (Munson)	Santa Rosa	909	4	"
St. Regis Paper Co.	Escambia	G-3	2	"
St. Regis Paper Co.	Escambia	CW-2	3	"
St. Regis Paper Co.	Escambia	D-21	1	"
St. Regis Paper Co.	Escambia	G-9	1	"
St. Regis Paper Co.	Madison	R-8	1	"
Buckeye Cellulose	Taylor	24-54	10	"
Buckeye Cellulose	Taylor	29-55	9	"
Buckeye Cellulose	Taylor	32-55	3	"
Buckeye Cellulose	Taylor	49-55	8	"
Hudson Pulp & Paper Co.	Putnam	198-55	1	"
Hudson Pulp & Paper Co.	Putnam	234-56	1	"
Hudson Pulp & Paper Co.	Putnam	299-56	1	"
Hudson Pulp & Paper Co.	Putnam	206-55	1	"
Container Corporation	Putnam	302-61	1	"
Container Corporation	Putnam	UB AH 38	1	"
Container Corporation	Putnam	UB AH 40-62	1	"
Gilman Paper Company	Madison	241-57	1	"
Gilman Paper Company	Madison	232-57	1	"
Gilman Paper Company	Madison	237-57	1	"
Owens-Illinois	Hamilton	5006-9-65	1	"
	Alachua	8-66	1	"

DISCUSSION

Fusarium moniliforme was recovered from 95 percent of all isolations made in this study. This is the first report of another organism being isolated so frequently from trees with "pitch canker" symptoms, with no recovery of *F. lateritium f. pini*. According to Snyder *et al.*, *F. roseum* was the only *Fusarium* sp. in addition to *F. lateritium* that has been isolated from trees with "pitch canker" symptoms. When used in inoculation studies, *F. roseum* failed to produce any symptoms associated with "pitch canker"; thus, it was concluded that *F. roseum* was non-pathogenic and secondary.

With such a high percentage of *F. moniliforme* isolated instead of *F. lateritium*, the pathogenicity of *F. moniliforme* on pine should be determined. If *F. moniliforme* is capable of producing "pitch canker" symptoms, then two possible explanations seem likely. Either this is a new report of another Fusarium species pathogenic to pine, or the fungus is identical to that originally described by Snyder *et al.*, and the difference in nomenclature is a taxonomic problem.

While identification of the causal organism is important, emphasis should be placed on developing control strategies.

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